

Integration of the Education Management Information System and Internal Efficiency in Government Secondary Schools: Correlational Evidence from Mezam Division, Cameroon

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Abstract: Cameroon has invested in digital information systems for school administration for more than a decade, yet government secondary schools continue to record high dropout, repetition and delayed completion. This study examined the relationship between the integration of the Education Management Information System (EMIS) and internal efficiency in government secondary schools in Mezam Division, North West Region of Cameroon. A cross-sectional correlational survey design was adopted within a positivist frame. Multistage sampling produced 504 respondents (65 administrative and 439 teaching personnel) drawn from ten government secondary schools with an accessible population of 1,429. Data were collected using a researcher-designed instrument, the EMIS Integration and Internal Efficiency Questionnaire, scored on a four-point Likert scale and validated by subject experts. Descriptive statistics and Spearman rank-order correlation were computed in SPSS. Respondents rated all four dimensions of EMIS integration above the criterion mean of 2.50: users' competencies and attitudes ($M = 3.20$), facility and infrastructure management ($M = 2.87$), data management practices ($M = 2.86$) and policy and regulatory framework ($M = 2.79$). Internal efficiency was rated at 2.89. Every dimension correlated positively and significantly with internal efficiency at $p < .001$: data management practices ($\rho = .888$), facility and infrastructure management ($\rho = .815$), users' competencies and attitudes ($\rho = .755$) and policy and regulatory framework ($\rho = .699$). The ordering suggests that what schools do with educational data matters more for internal efficiency than the policy environment surrounding them. Schools in the sample were stronger at recognising the value of EMIS than at operating it, and stronger at monitoring efficiency indicators than at improving the processes behind them. The study recommends standardised data collection protocols, school-level data quality audits, dedicated technical support at divisional level and sustained investment in server infrastructure and power supply.

Keywords: education management information system; internal efficiency; educational data; secondary education; Cameroon.

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Introduction

Education systems in low-income countries collect more data than they use. Ministries file enrolment returns, schools keep registers and development partners fund reporting platforms, but the resulting information rarely reaches the point where a principal decides which learner needs support or where a budget line should be moved. This gap between collection and utilisation defines much of the contemporary debate about the Education Management Information System, hereafter EMIS.

An EMIS is the organised set of procedures, people and technologies through which an education system produces, stores, analyses and disseminates the information required for planning, monitoring and decision making (Cassidy, 2006; Chapman & Mahlick, 1993). Its promise is straightforward: administrators who can see enrolment, attendance and performance in near real time can intervene before a learner disengages, and planners who can see where resources sit can move them to where they are needed. Abdul-Hamid (2014, 2017) argues that this promise is realised only when the system is embedded in institutional routine rather than treated as an annual reporting obligation.

Internal efficiency describes the capacity of an education system to move a cohort through a prescribed cycle with minimum wastage (Coombs & Hallak, 1987; Chapman, 2008). It is measured through promotion, repetition, retention, transition, dropout and completion rates, together with the productive use of teacher time, instructional materials and finance. A school in which learners repeat grades, leave before completion or spend more years than the cycle requires converts public expenditure into loss without producing graduates.

Cameroon articulated its commitment to data-driven educational governance in the Education and Training Sector Strategy for 2013 to 2020 and reaffirmed it in the National Development Strategy 2020 to 2030 (Government of Cameroon, 2013, 2020). Implementation has been uneven. Educational data remain compartmentalised across the Ministry of Basic Education, the Ministry of Secondary Education and the Ministry of Higher Education, which prevents longitudinal tracking of a learner from primary entry to tertiary exit and leaves planners unable to see the cumulative effect of wastage across the cycle. At school level, principals report fragmented tools, unreliable connectivity and little specialised training.

Mezam Division presents a demanding test of these arrangements. It hosts the largest concentration of secondary schools in the North West Region and serves as the regional administrative center, yet it has absorbed a socio-political crisis since 2016 that has closed schools, displaced learners and teachers, damaged infrastructure and disrupted supervision. Under these conditions accurate learner records

are simultaneously harder to maintain and more valuable to hold.

Existing Cameroonian scholarship on educational information systems has concentrated on higher education institutions and on administrative effectiveness rather than on secondary schooling and learner flow. International evidence linking EMIS to educational outcomes comes largely from settings with stable infrastructure and consolidated national platforms, which limits its transferability. Little is therefore known about whether, and through which dimensions, EMIS integration relates to internal efficiency in Cameroonian government secondary schools.

This study addressed that gap. It asked one general and four specific questions. Generally, to what extent does EMIS integration relate to internal efficiency in government secondary schools in Mezam Division? Specifically, what is the relationship between internal efficiency and, respectively, the policy and regulatory framework, facility and infrastructure management, users' competencies and attitudes, and data management practices? Five alternative hypotheses were tested, each proposing a significant relationship between one dimension of EMIS integration and internal efficiency.

Theoretical framework

Three frameworks informed the study. Systems theory treats a school as an open system whose subsystems exchange inputs, processes, outputs and feedback (Hoy & Miskel, 2013). EMIS occupies the feedback position: attendance data prompt teacher action, teacher reports inform administrative decisions, those decisions shape resource allocation, and the resulting outcomes re-enter the system as new data. Weakness at any point degrades the whole loop.

The information systems success model holds that system quality, information quality and service quality shape system use and user satisfaction, which in turn determine organisational benefit (DeLone & McLean, 1992, 2003). Applied here, the model predicts that infrastructure quality and data quality should each carry measurable weight, and that neither will produce benefit without use.

Human capital theory holds that investment in knowledge and skill raises productivity. Teachers and administrators generate, validate and interpret school data, so their competence sets a ceiling on what any platform can deliver. The technology acceptance model complements this by identifying perceived usefulness and perceived ease of use as the proximate determinants of adoption (Davis, 1989), which locates user attitude alongside user skill as a condition for integration.

Methodology

The study adopted a cross-sectional correlational survey design within a positivist paradigm. A correlational design suits variables that occur naturally and cannot be manipulated, and it permits estimation of the direction and strength of association across a large number of respondents at a single point in time. No causal claim is advanced. Data were collected in Mezam Division, North West Region of Cameroon. The division covers roughly 1,745 square kilometres across seven subdivisions, with Bamenda as both divisional headquarters and regional capital. Its schools span urban, peri-urban and rural settings and vary widely in ICT availability, administrative capacity and level of EMIS adoption, which makes it suitable for examining variation in integration.

The target population comprised educational personnel directly involved in planning, administration, finance, data management and instructional supervision in government

secondary schools in Mezam Division: principals, vice-principals, bursars, heads of department, heads of service, discipline masters and mistresses, ICT coordinators and classroom teachers. Ten government secondary schools were purposively selected on the basis of operational status and accessibility during the data collection period, yielding an accessible population of 1,429 personnel comprising 150 administrative and 1,279 teaching staff. Sample size was determined using the Cochran formula for finite populations, giving 504 respondents. Multistage sampling proceeded in four stages. Schools were selected purposively. Respondents were then stratified into administrative and teaching personnel. Administrative officers were selected purposively on the basis of their role-specific knowledge of EMIS operations. Heads of department and classroom teachers were selected by proportionate simple random sampling within each school. The realised sample comprised 65 administrative and 439 teaching personnel.

Table 1: *Distribution of the accessible population and the sample by school*

School	Population: admin.	Population: teaching	Sample: admin.	Sample: teaching
GBHS Bamendankwe	15	193	9	65
GTHS Bamendankwe	16	157	5	30
GBHS Downtown	18	169	10	54
GBHS Bamenda	33	189	10	50
GBHS Bayelle	10	84	5	30
GBHS Atiela	18	142	3	25
GBTHS Bamenda	12	295	5	45
CCAST Bambili	16	167	10	100
GSS Baforkum	7	26	5	10
GTC Ntigi	5	57	3	30
Total	150	1,279	65	439

Note. $N = 504$.

2.4 Instrument

Data were collected with the EMIS Integration and Internal Efficiency Questionnaire, developed for this study. Section A recorded demographic characteristics. Section B measured four dimensions of EMIS integration: policy and regulatory framework (10 items), facility and infrastructure

management (11 items), users' competencies and attitudes (10 items) and data management practices (11 items). Section C measured internal efficiency (10 items) through resource utilisation, time management, record accuracy, administrative responsiveness, progression tracking, repetition tracking, dropout level and instructional time.

Items were scored on a four-point Likert scale from strongly disagree (1) to strongly agree (4), giving a criterion mean of 2.50. Face and content validity were established through expert review by specialists in educational management and measurement, who assessed item clarity, relevance and coverage of the constructs. Reliability was examined through a pilot administration in schools outside the study area using a test-retest procedure and internal consistency estimation.

Responses were coded and analysed in SPSS. Research questions were answered with frequencies, percentages, means and standard deviations, with dimension scores compared against the criterion mean of 2.50. Because the items produced ordinal data and the distributional assumptions of parametric correlation were not met, hypotheses were tested with the Spearman rank-order correlation coefficient, which estimates monotonic association without assuming linearity or normality. Statistical significance was set at .05. Item-level missing responses on the data management and internal efficiency scales reduced the valid case count for correlation analysis to 501.

Respondent characteristics

Women made up 60.5% of respondents ($n = 305$) and men 39.4% ($n = 199$). Respondents aged 36 to 45 formed the largest age group at 36.7% ($n = 185$), followed by those aged 46 and above at 35.3% ($n = 178$) and those aged 25 to 35 at 27.9% ($n = 141$). Almost three quarters of the sample was therefore over 35, indicating a workforce with substantial institutional experience. On professional qualification, 59.1% ($n = 298$) held DIPES or DIPET I and 40.8% ($n = 206$) held DIPES II, DIPEN or DIPET II. On academic qualification, 52.1% ($n = 263$) held the Baccalaureate or Advanced Level, 36.7% ($n = 185$) held a bachelor's degree and 11.1% ($n = 56$) held a master's degree or higher.

Descriptive findings

Table 2 summarises the dimension scores. All five constructs exceeded the criterion mean of 2.50, but none approached the scale ceiling. Users' competencies and attitudes recorded the highest mean and the lowest dispersion. The policy and regulatory framework recorded the lowest mean.

Table 2: Dimension means, item ranges and interpretation

Dimension	Items	Grand M	Item M range	SD range
Users' competencies and attitudes	10	3.20	2.91 to 3.39	0.76 to 1.09
Facility and infrastructure management	11	2.87	2.64 to 3.05	1.05 to 1.19
Data management practices	11	2.86	2.66 to 2.95	1.07 to 1.18
Policy and regulatory framework	10	2.79	2.65 to 2.97	1.06 to 1.21
Internal efficiency	10	2.89	2.64 to 3.05	0.99 to 1.18

Note. Four-point scale; criterion mean = 2.50. N = 501 to 504 depending on item.

Within the policy dimension, the highest-rated item concerned the use of EMIS data to inform planning and management decisions ($M = 2.97$, $SD = 1.06$), and the lowest concerned the influence of policy on data use in school management practice ($M = 2.65$, $SD = 1.21$). Respondents therefore endorsed the principle of evidence-based decision making more strongly than they endorsed its presence in daily administration.

Within the facility dimension, the highest-rated item concerned CCTV monitoring ($M = 3.05$, $SD = 1.06$) and the lowest concerned the security, maintenance, power supply and cooling of structures housing EMIS servers ($M = 2.64$, $SD = 1.19$). The weakest link in the physical infrastructure

was thus the component on which system availability most directly depends.

Within the competencies dimension, the highest-rated item concerned the availability of technical skills for data entry, analysis and interpretation ($M = 3.39$, $SD = 0.78$), while the lowest concerned the adequacy of training received ($M = 2.91$, $SD = 1.09$). Respondents rated the skills present in their institutions more highly than the training that produced them.

Within the data management dimension, the highest-rated item concerned the importance of protecting sensitive educational data ($M = 2.95$, $SD = 1.07$) and the lowest concerned data reliability and validity ($M = 2.66$, $SD = 1.18$). Respondents also agreed that integrating data across

sources is complex and time consuming ($M = 2.90$, $SD = 1.11$).

Within the internal efficiency scale, the strongest items concerned monitoring functions: tracking instructional time ($M = 3.05$, $SD = 0.99$), tracking repetition ($M = 3.04$, $SD = 1.01$) and measuring teaching quality ($M = 3.00$, $SD = 1.01$). The weakest item concerned enforcement of time management within the school day ($M = 2.64$, $SD = 1.18$), followed by resource utilisation ($M = 2.83$, $SD = 1.14$) and

record accuracy ($M = 2.83$, $SD = 1.10$). Schools measured efficiency more capably than they produced it.

Correlational findings

Spearman rank-order correlations between each dimension of EMIS integration and internal efficiency appear in Table 3. All four coefficients were positive and significant at $p < .001$, so all four null hypotheses were rejected.

Table 3: Spearman correlations between EMIS integration dimensions and internal efficiency

Dimension	Rho	p	N	Strength
Data management practices	.888	< .001	501	Very strong
Facility and infrastructure management	.815	< .001	501	Very strong
Users' competencies and attitudes	.755	< .001	501	Strong
Policy and regulatory framework	.699	< .001	501	Strong

Note. All correlations significant at the .01 level, two-tailed.

The ordering of coefficients is the substantive result. Data management practices produced the strongest association, followed by facility and infrastructure management, then users' competencies and attitudes, and finally the policy and regulatory framework. Dimensions closest to the daily handling of educational information tracked internal efficiency more closely than the governance environment surrounding them.

Discussion

Three findings deserve emphasis. First, every dimension of EMIS integration correlated positively and significantly with internal efficiency, which supports the general proposition that information systems function as management instruments rather than reporting overhead. Second, the dimensions did not carry equal weight, and the ranking runs opposite to the sequence in which resources are usually committed. Third, the descriptive pattern shows schools that recognise the value of EMIS more clearly than they operate it.

Data management as the proximate correlate

Data management practices produced the strongest coefficient ($\rho = .888$) while receiving one of the lower descriptive ratings ($M = 2.86$), with reliability and validity the weakest item on the scale ($M = 2.66$). Schools in the sample collect from multiple sources and recognise the importance of protecting what they hold, yet doubt whether the resulting records can be trusted. This combination matters because internal efficiency indicators are themselves

data products. A dropout rate is a claim about registers, and a progression rate is a claim about examination and enrolment records. Where those records are unreliable, a school cannot detect the inefficiency it is trying to reduce, let alone act on it.

The finding aligns with the information quality construct in the DeLone and McLean model (2003), which places accuracy, completeness, timeliness and consistency ahead of technical sophistication in determining organisational benefit. It also matches the caution in Abdul-Hamid (2014) that an EMIS produces value at the point of use rather than at the point of installation.

Infrastructure as a binding constraint

Facility and infrastructure management produced the second strongest coefficient ($\rho = .815$). The item-level pattern locates the constraint precisely: respondents rated computer laboratories, projectors and CCTV comparatively well, but rated server housing, power supply and cooling lowest of all facility items ($M = 2.64$). Visible classroom technology has advanced further than the unglamorous back-end on which system availability depends. A school with a functioning laboratory and an unprotected server loses records to power failure and heat, and the loss falls on exactly the longitudinal data that learner tracking requires.

The socio-political crisis affecting the North West Region since 2016 compounds this. School closures, displacement, damaged premises and interrupted connectivity have reduced both the capacity to maintain equipment and the continuity of the records held on it. Systems theory treats a

school as an open system shaped by its environment, and Mezam Division illustrates the point: the same instability that raises the value of accurate learner tracking also degrades the conditions for producing it.

Competence, attitude and the training gap

Users' competencies and attitudes recorded the highest descriptive mean ($M = 3.20$) and the third strongest correlation ($\rho = .755$). Within this dimension, respondents rated available technical skills highest ($M = 3.39$) and training received lowest ($M = 2.91$). Skill in these schools appears to have been acquired informally rather than delivered systematically, which makes it uneven across institutions and vulnerable to staff transfer. Human capital theory frames the implication: capability that a school did not invest in is capability it cannot reproduce when the person holding it leaves.

The high attitude ratings carry a different implication. Perceived usefulness predicts adoption (Davis, 1989), and respondents endorsed the claim that EMIS improves decision quality ($M = 3.18$) and increases transparency ($M = 3.10$). Willingness is therefore not the bottleneck in these schools. Investment in structured training would meet a receptive workforce.

Policy as a distal condition

The policy and regulatory framework produced the weakest coefficient ($\rho = .699$), still strong by the standards of educational research but the lowest of the four. Its item pattern explains why. Respondents endorsed the existence of legal frameworks, data quality measures and coordination mechanisms, but gave the lowest rating to the influence of policy on data use in school management practice ($M = 2.65$) and a low rating to stakeholder understanding of EMIS policy ($M = 2.73$). Policy in these schools exists on paper and reaches practice unevenly, so it operates as an enabling condition for the other three dimensions rather than as a direct correlate of learner flow.

Monitoring without process improvement

The internal efficiency scale showed a consistent split. Items about measurement (tracking instructional time, tracking repetition, measuring teaching quality) scored at or above 3.00. Items about operations (enforcing time management, utilising resources, maintaining accurate records) scored between 2.64 and 2.83. Schools in Mezam Division count wastage more capably than they reduce it. The practical consequence is that additional reporting requirements are unlikely to improve efficiency on their own, because reporting is the part that already works.

Conclusion and Recommendations

EMIS integration is related to internal efficiency in government secondary schools in Mezam Division across all four dimensions examined, and the strength of that

relationship rises as the dimension moves closer to the daily handling of learner data. Schools rated their commitment to EMIS more highly than their capacity to operate it, and rated their monitoring of efficiency more highly than the operational processes that produce it.

Five recommendations follow directly from the item-level findings. The Ministry of Secondary Education should issue standardised protocols for collecting enrolment, attendance, performance and staffing data, since the reliability item drew the lowest rating on the strongest correlate. Schools should constitute data quality teams to verify records before submission and should undergo periodic data audits at divisional level, which addresses accuracy without requiring new technology. Regional and divisional delegations should fund server housing, backup power and cooling ahead of further front-end equipment, because these items recorded the lowest facility ratings and determine whether records survive. Teacher training institutions should embed educational data management in pre-service curricula, and delegations should run structured in-service programmes, since respondents reported skill without corresponding training. Delegations should also station technical support personnel at divisional level so that system failures do not persist for weeks in individual schools.

Future research should track internal efficiency using cohort records rather than perception, follow schools longitudinally to establish direction of influence, and extend the design to regions unaffected by the crisis so that the contribution of instability can be separated from the contribution of capacity.

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